

Efficiency of List operations

Given for first;
middle; last
positions
when
givenPosition
is a
parameter

Operation	Array Implementation	Singly-Linked Chain Implementation with Head Reference	Singly-Linked Chain Implementation with Head and Tail Reference
add(newEntry)	$O(1)$	$O(n)$	$O(1)$
add(newPosition, newEntry)	$O(n)$; $O(n)$; $O(1)$	$O(1)$; $O(n)$; $O(n)$	$O(1)$; $O(n)$; $O(n)$
toArray()	$O(n)$	$O(n)$	$O(n)$
remove(givenPosition)	$O(n)$; $O(n)$; $O(1)$	$O(1)$; $O(n)$; $O(n)$	$O(1)$; $O(n)$; $O(n)$
replace(givenPosition, newEntry)	$O(1)$	$O(1)$; $O(n)$; $O(n)$	$O(1)$; $O(n)$; $O(1)$
getEntry(givenPosition)	$O(1)$	$O(1)$; $O(n)$; $O(n)$	$O(1)$; $O(n)$; $O(1)$
contains(anEntry)	$O(n)$	$O(n)$	$O(n)$
clear(), getLength(), isEmpty()	$O(1)$	$O(1)$	$O(1)$